

Application No.10/828,521
Reply to Office Action of September 26, 2006

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REMARKS

Applicant notes the transfer of responsibility for this case to Examiner Asinovsky and notes with appreciation the well-reasoned Office Action of Paper No. 20060915. This amendment is submitted to be fully responsive to that Action.

Applicant affirms that inventorship is unchanged based upon election of composition claims 1-11. This election to advance prosecution of claims 1-11 is also affirmed.

The basis of Applicant's traverse as to the restriction requirement is that Group I corresponding to claims 1-11, classified in class 525/353; and Group II corresponding to claims 12-20, classified in class 525/333.5, 344 and 353 and having a search classification overlapping in part. Additionally, the subject matter of claim 8 that has been examined as part of Paper No. 20060915 constitutes subject matter overlapping in part with nonelected Group II corresponding to claims 12-20. Further, the amendment offered to Group II claims also lessen any burden associated with the examination of those claims. It is respectfully submitted that a simultaneous examination of independent claim 12 and those claims that depend therefrom, namely claims 13-20, would not constitute an undue examination burden. As such, rejoinder of claims 11-20 and consideration of these claims in the course of this prosecution is respectfully requested.

By way of this amendment, claims 1 and 6 have been amended while claims 3, 4, 13 and 21-30 have been canceled. Claims 12 and 14-20 have been withdrawn with simultaneous amendment being made to claims 12 and 14 with the expectation that independent claim 12 and those that depend therefrom may be subject to rejoinder based on the above remarks. Support for the amendments to claim 1 is found in claim 3 as filed as well as paragraph [0017] reciting

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with specificity nitrogen and phosphorus as preferred pnictogens. Amendments to withdrawn claim 12 are likewise so supported. Support for the amendment to the specification to add the parenthesis in [0009] and to claim 12 is submitted to be inherent with the correction of an obvious typographical error consistent with the invention disclosure found within [0002], [0017], [0019], [0025]-[0029], and claim 1 as originally filed. The remaining amendments to claims 6 and 14 are submitted to correct obvious typographical errors. As such, it is submitted that no new matter has been added to the application by way of the above amendments.

Currently, claims 1, 2 and 5-11 stand rejected under 35 U.S.C. §103(a) over Tan et al. (U.S. Patent 6,579,948) in view of Storey et al. (U.S. Patent 5,039,752) or vice versa. Additionally, claims 1, 2 and 5-11 stand rejected under 35 U.S.C. §103(a) over Tan et al. in view of Wood et al. (U.S. Patent 4,086,171). Lastly, now canceled claims 4 and 13 that have been incorporated into independent claims 1 and 12, respectively, are rejected under 35 U.S.C. §112, second paragraph, with respect to the term "pnictogen" being of Greek origin. In view of the amendments to claims 1 and 12 to replace "pnictogen" group elements with the specific recitation of nitrogen and phosphorus per specification [0017], it is respectfully submitted that the claim rejection under 35 U.S.C. §112, second paragraph, has been addressed and as such, it is respectfully requested that it be withdrawn.

**Remarks Directed to Rejection of Claims 1, 2 and 5-11 under
35 U.S.C. §103(a) over Tan et al. in View of Storey et al. or Vice Versa**

Tan et al. is cited as disclosing a sulfonated block copolymer of polystyrene and polyisobutylene in which the polystyrene block sulfonation level is between 1 and 70 mole percent. The sulfonated polystyrene block is cited as readable on claimed block A and the polyisobutylene block is cited as being readable on the claimed block B. Tan et al. is noted as

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being deficient in failing to claim the cation Z in the RZ segment. In order to bolster the limitations of Tan et al., Storey et al. is cited for teaching the reaction of a block copolymer of polystyrene and polyisoprene blocks in which the polystyrene is sulfonated and has been reacted to form ionic sulfonic acid salts through reaction with "alkali metal, amine, amine derivative" (Paper No. 20060915, section 12, pages 5-6).

In response to this rejection, Applicant submits that reliance on Storey et al. as a secondary reference is misplaced on the basis that Z being a cation per independent claim 1 encompasses a proton and preferably sulfonic acid for the group RZ as detailed in specification [0017]. As such, Applicant submits that in regard to the broadest pending claim, namely claim 1, Tan et al. does in fact disclose the claimed cation Z in the RZ segment. Comparing pending independent claim 1 to Tan et al., Applicant is in agreement that Tan et al. teaches a degree of polystyrene block sulfonation to a maximal taught value of 70 mole percent. In contrast to the teachings of Tan et al., pending claim 1 has a degree of RZ inclusion of thermoplastic block copolymer A of over 70 mole percent. It is respectfully submitted that one of ordinary skill in the art at the time the present invention was made considered sulfonation levels of polystyrene monomer in a copolymer above 70 mole percent to be "impractical or impossible" based on decreases observed in solubility with increasing sulfonation level yet "surprisingly [the increase in sulfonation above 70 mole percent] does not prevent further sulfonation." Instant specification [0019].

To further support Applicant's position that sulfonation levels above 70 mole percent of thermoplastic block copolymer A according to pending claim 1 represents a surprising result over Tan et al., reference is made to the appended declaration of Eugene Napadensky showing

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proton conductivity, methanol conductivity and water/methanol selectivity for samples denoted S-SIBS-X where X is the mole percent sulfonation where X extends from 0 to 88 mole percent sulfonation. This is the same convention used in Tan et al. The oversized triangle, square and cross data points correspond to 85 mole percent sulfonation with a cesium cation substitute for the proton cation is provided for the remaining data points. As the data provided in the declaration of Eugene Napadensky makes clear, the properties of the claimed copolymer compositions having a level of sulfonation exceeding 70 mole percent are both desirable and not predicted in the teachings of Tan et al.

With respect to Storey et al., claim 1 recites block B being polyisobutylene. Applicant submits that the substitution of polyisoprene for polyisobutylene as advocated in the outstanding Office Action (Paper No. 20060915, section 12, page 7, second paragraph) failed to yield the invention as claimed. Applicant's position is further detailed with respect to the declaration of Eugene Napadensky attached hereto. Applicant submits that attempting a sulfonation reaction in the presence of polyisoprene will result in reaction with the aliphatic unsaturated double bonds found in polyisoprene and absent from polyisobutylene. Additionally, the structural differences between polyisobutylene and polyisoprene will necessarily lead to a difference in packing configuration having effects on phase segregation, self assembly and the semipermeable membrane properties of the inventive copolymer composition.

Additionally, while the prior art contemplates neutralization with alkali metal, this teaching does not extend to the lanthanide species cation of claim 6 or the specific alkali metal cesium per claim 7. Applicant submits that one of skill in the art contemplating neutralization would resort to the common alkali metal cations of sodium or potassium. The results provided in

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the attached declaration of Eugene Napadensky make clear that the placement of protons in sulfonic acid groups by cesium cations provides performance results in the resultant membrane that would not be predicted based on the prior art.

With respect to claim 8, while Tan et al. does provide a teaching as to a copolymer having the structure A-B-A, Storey et al. lacks a corresponding teaching to this structure, and, as such, resultant subject matter of claim 8 is submitted to be patentable over Tan et al. on the basis of the level of sulfonation over Tan et al. and the lack of bolstering teaching with respect to this type of block copolymer structure or the level of claimed sulfonation.

As such, Applicant submits that the pending claims represent a surprising result for Tan et al. with respect to the mole percentage of sulfonation present in the pending claims. Additionally, the combination of Tan et al. and Storey et al. is submitted to fail to yield the claimed invention on the basis of substituting polyisoprene for Storey et al. for the polyisobutylene of Tan et al. would result in an undesired sulfonation reaction on the polyisoprene as well as impacting properties of the resultant semipermeable membrane copolymer composition including phase segregation, packing density, and self assembly.

In light of the above remarks and amendments, reconsideration and withdrawal of the rejection as to claims 1, 2 and 5-11 is respectfully requested.

**Remarks Directed to Rejection of Claims 1, 2 and 5-11
under 35 U.S.C. §103(a) over Tan et al. in View of Wood et al.**

Tan et al. is cited for the teachings as summarized above and found deficient with respect to the claimed cation Z in the RZ segment. Wood et al. is cited to bolster the teaching of Tan et al. with respect to the teaching of a copolymer A-B where A is a sulfonated polystyrene

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and B is a hydrogenated conjugated diene block. Wood et al. is also cited for the teaching of neutralizing sulfonated block copolymer with alkali metals and alkali earths.

With respect to this rejection, as detailed above, Applicant submits that Tan et al. does, in fact, teach the claimed cation Z being H⁺ consistent with claim 1 and Applicant hereby incorporates by reference the above remarks distinguishing the pending claims from Tan et al.

Applicant submits that the combination of Tan et al. with Wood et al. remains deficient on the basis that Wood et al. teaches only very low levels of sulfonation well below the 70 mole percent of Tan et al. and still further below that of the claimed invention. As detailed above, Applicant submits that the claimed level of sulfonation represents an effort that was disfavored by the prior art and as the graph within the declaration of Eugene Napadensky makes clear, represents a surprising result over data obtained below 70 mole percent sulfonation.

Additionally, while the prior art contemplates neutralization with alkali metal, this teaching does not extend to the lanthanide species cation of claim 6 or the specific alkali metal cesium per claim 7. Applicant submits that one of skill in the art contemplating neutralization would resort to the common alkali metal cations of sodium or potassium. The results provided in the attached declaration of Eugene Napadensky make clear that the placement of protons in sulfonic acid groups by cesium cations provides performance results in the resultant membrane that could not be predicted based on the prior art.

With respect to claim 8, while Tan et al. does provide a teaching as to a copolymer having the structure A-B-A, Wood et al. lacks a corresponding teaching as to this structure, and, as such, resultant subject matter of claim 8 is submitted to be patentable over Tan et al. on the

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basis of the level of sulfonation over Tan et al. and the lack of bolstering teaching with respect to this type of block copolymer structure or the level of claimed sulfonation.

In light of the above amendments and remarks, reconsideration and withdrawal of the rejection as to claims 1, 2 and 5-11 under 35 U.S.C. §103(a) over Tan et al. in view of Wood et al. is requested.

Summary

Claims 1, 2 and 5-11 are currently subject to examination. Reconsideration of the restriction requirement to include examination of independent claim 12 and claims 13-20 which depend therefrom is requested in light of this rejoinder representing an undue burden in light of the common search classification and overlapping subject matter of claims 12-20 relative to pending claim 8 that has already been subjected to examination. Claims 3, 4, 13 and 21-30 have been canceled. Claims 1, 5, 6, 12 and 14 have been amended in concert with withdrawal of claims 12 and 14-20 consistent with the restriction requirement. All the pending claims are submitted to be in allowable form and directed to patentable subject matter. Reconsideration and withdrawal of the rejections and the passing of this application to issuance are solicited. Should the Examiner have any suggestions as to how to improve the form of any of the pending claims, she is respectfully requested to contact the undersigned attorney responsible for this application to resolve those outstanding issues.

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Respectfully submitted,

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